EXHIBIT 2 TO UNOPPOSED MOTION OF UNITED STATES FOR ENTRY OF CONSENT DECREE

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS

UNITED STATES OF AMERICA, Plaintiff, v. FLINT HILLS RESOURCES PORT ARTHUR, LLC, Defendant.	No. 1:14-cv-00169-RC

DECLARATION OF PATRICK FOLEY

I, Patrick Foley, do declare and affirm as follows:

1. I am currently employed as an Environmental Engineer in the U.S. Environmental Protection Agency's Office of Civil Enforcement in Washington, D.C. I have been an Environmental Engineer with EPA since 1990, and have been working on issues related to chemical and petrochemical plants for many years and on issues related to combustion efficiency at industrial flares since 2009. I received a Bachelor of Science Degree in Chemical Engineering from the Rutgers University College of Engineering in 1987.
2. I have inspected over 200 industrial facilities and have conducted, overseen, or been an advisor on in-depth investigations focusing on compliance with flaring minimization and efficiency requirements at more than 10 industrial facilities.
3. I maintain current knowledge of the character and quantity of air pollutant emissions from industrial flares, as well as the pollution control technologies available for use at flares. In addition, I evaluate technical data and information related to air pollutant

emissions from refinery, chemical, and petrochemical plant operations, and available air pollution control technologies to determine the effectiveness and economic impact of various air pollution control scenarios. I routinely direct and oversee the calculation of air emissions reductions resulting from flaring and other air pollution controls.

4. I have been the lead engineer for EPA's efforts to reduce pollution from industrial flares since the inception of EPA's efforts to do so in 2009. In that capacity, I regularly provide technical guidance, advice, and assistance to EPA senior management and staff on matters relating to air emissions from industrial flares.

5. I have played an active role in negotiating each of EPA's four other judicial settlements regarding flare minimization and efficiency. I participate in overseeing the implementation of the requirements of those settlements.

6. Except in two areas, I served as the lead engineer in the negotiations that resulted in a Consent Decree with Flint Hills Resources ("FHR") that was lodged with the United States District Court for the Eastern District of Texas on March 20, 2014 ("Consent Decree" or "Decree"). In the areas of the Consent Decree related to Leak Detection and Repair "LDAR") and the Benzene Waste Operations NESHAP ("BWON"), Jennifer Huser, in EPA's Dallas office, was EPA's lead environmental scientist.

7. FHR's facility in Port Arthur, Texas is a petrochemical and chemical plant (the "Facility"). It operates 24 hours a day, 365 days a year. Based on publicly-available information, the Facility employs approximately 250 people and has the capacity to produce nearly 1.4 billion pounds per year of ethylene and 700 million pounds per year of propylene.

8. Ethylene and propylene—both of which belong to a class of hydrocarbons known as olefins—are the basic chemical building blocks used to manufacture a variety of products such as medical devices, automotive parts and appliance components. The Facility also houses smaller units that produce chemicals such as cyclohexane and use benzene and 1,3 butadiene in their processes. Benzene and 1,3 butadiene belong to a class of compounds known as “hazardous air pollutions,” or “HAPs” for short.

9. During the process of manufacturing petrochemicals such as ethylene and propylene and chemicals such as cyclohexane, industrial plants produce waste gases which contain volatile organic compounds (“VOCs”) and HAPs.

10. Waste gases can be burned in a combustion device known as a flare, which uses an open flame for burning. When properly used, flares at petrochemical and chemical plants serve as safety devices to destroy waste gases resulting from sudden, infrequent, and not reasonably preventable malfunctions of process equipment. In the last twenty-five years, flares have been increasingly used as pollution control devices for waste gases that contain VOCs or HAP compounds.

11. Generally, flares look like tall (sometimes 150 to 200 feet high), thin pipes, often surrounded by a steel framework for support. Gases under pressure are sent to the top of the “pipe.” Specialized flare tips at the top are designed to facilitate the combustion of waste gas and the mixing of the waste gas with the oxygen in the ambient air. The mixing of the waste gas and oxygen at the flare tip can be enhanced by the use of steam. Flares of this type are called “steam-assisted flares.”

12. FHR's Facility has three steam-assisted flares: one that serves the olefins plant (the "LOU Flare"); one that is a back-up to the LOU Flare (the "LOU Flare 2"); and one that serves the chemical plant (the "AU Flare"). All three flares are elevated flares.

13. EPA has identified two trends that result in excess pollution from flares: too much flaring and oversteaming of flares.

14. Across the country, state air pollution control agencies, citizens groups, and EPA have determined that companies often send waste gas to flares that is generated, not by emergencies, but by routine or preventable circumstances. Moreover, EPA has concluded that companies often have modified flares without securing required permits which would have imposed air pollution control requirements on the flares. These practices contravene EPA rules and regulations. Two solutions to excessive flaring are the elimination of the sources of waste gas flow to flares ("waste gas minimization") and the recovery and recycling of the waste gas as fuel for production processes ("flare gas recovery").

15. "Waste gas minimization" can be achieved by evaluating and analyzing the tens or hundreds of waste gas connections to flares and eliminating or rerouting the sources of this waste gas. Acoustical monitoring devices or isotopic tracing mechanisms can be used to find and fix the sources of waste gas that are leaking—undetected—into the myriad of lines that lead to flares. In effect, waste gas minimization is a practice that looks back into the facility and identifies, connection by connection, the sources of waste gas flowing to flares and either reroutes the gas or eliminates the source of the gas.

16. Flare gas recovery, in contrast, is an "end of line" technology solution. It relies upon the installation and operation of a "flare gas recovery system" or FGRS. A FGRS is a device

that captures and compresses waste gases before they enter the flare stack and sends those gases back to a refinery's fuel gas system for reuse.

17. A flare is designed to convert the VOCs and carbon-containing HAPs in waste gas into water and carbon dioxide. The "combustion efficiency" of a flare is a measure of the completeness of the chemical reaction within the flare's flame and refers to whether all of the carbon-containing molecules within the waste gases are fully reacted to form carbon dioxide and water. If a flare achieves 100% combustion efficiency, then all carbon-containing molecules are reacted with oxygen to create carbon dioxide and water.

18. A flare's combustion efficiency depends on many variables including the heating value of the waste gas (*i.e.*, its combustibility). If the heating value of the waste gas in the flame (*i.e.*, combustion zone) of a flare is too low, flame temperature is too low, combustion is incomplete and unburned VOCs and HAPs are emitted. The lack of combustion zone heating value can be caused by, *inter alia*, too much steam—which depresses the heating value of the gas in the combustion zone and quenches the flame temperature—and/or too little heat content in the waste gas itself.

19. Until recently, steam addition at most flares generally has had two weaknesses. First, steam addition generally has been controlled by a single valve that does not have enough sensitivity to "fine tune" the amount of steam added. Second, the valve generally has been operated manually by an operator, who usually has many other duties. This "manual" control scheme for steam addition can lead to oversteaming, which in turn leads to the emission of uncombusted VOCs and HAPs.

20. Similarly, flare operators historically have added supplemental gas (which increases the heat content of the waste gas) in reaction to measurements of the heat content of the

waste gas *before* it mixes with steam. Because of that, the supplemental gas addition rate is at times insufficient to ensure high heat content in the gas after it mixes with the steam.

21. The problem of incomplete combustion can be addressed by measures that better match the amount of steam and/or supplemental gas to other flare conditions. This requires improved monitoring of the relevant parameters and better control systems that allow fine-tuning the steam and supplemental gas addition rate. Furthermore, the addition of steam and supplemental gas can be automated.

22. Multiple requirements under the CAA apply to flares. The regulatory regime applicable to flares corresponds to a flare's role both as a "source" of pollution and as a control device.

23. Flares are a source of pollution. Whenever a company plans to construct a source of pollution or whenever a company plans to modify a source of pollution where the modification may result in an increase in emissions, the company first must secure a permit. The type of permit depends on a number of factors. The three main types of permits for the construction or modification of air pollution sources are: Prevention of Significant Deterioration ("PSD") permits, Nonattainment New Source Review ("NNSR") permits, and Minor Source permits. 42 U.S.C. § 7475 and 40 C.F.R. § 52.21 (for PSD permits); 42 U.S.C. §§ 7502(c)(5), 7503(a)–(c) and 40 C.F.R. Part 51, Appendix S, Part IV, Conditions 1–4 (for NNSR permits); 40 C.F.R. § 51.160 (requiring states to have a Minor Source permit program).

24. Generally, after securing a PSD, NNSR, and/or Minor Source permit and undertaking the construction or modification allowed by the permit, a company that operates a facility that is considered a "major source" under the CAA must ensure that the limitations and

requirements imposed by the PSD, NNSR, and/or Minor Source permit are incorporated into something called a "Title V" permit. A Title V permit is an operating permit for a facility that consolidates all applicable CAA requirements into one permit. 40 C.F.R. § 70.1(b).

25. Certain regulations promulgated under the CAA's New Source Performance Standards ("NSPS") and National Emission Standards for Hazardous Air Pollutants ("NESHAPs") allow companies to use flares as pollution control devices for gas streams. If a company elects to use a flare as a control device, requirements under the NSPS and/or NESHAPs apply. These requirements are found at 40 C.F.R. §§ 60.18, 61.12, and 63.11(b).

26. In September of 2009, FHR met with personnel from EPA's headquarters in Washington. Personnel from EPA Region 6 joined the meeting by telephone. I was present at this meeting. By that time, FHR was well aware of EPA's concern over excess emissions from industrial flares. FHR indicated that it wanted to resolve its potential liability not only for possible LDAR and BWON violations (that Region 6 had learned of) but also for flaring. EPA, under my lead, subsequently reviewed a significant amount of data related to FHR's flares and determined that FHR not only was flaring a considerable amount of waste gas but also that the combustion efficiency of FHR's flares was poor. Subsequently EPA and FHR commenced settlement discussions which ultimately resulted in the proposed Consent Decree.

27. In August of 2011, during the course of negotiations with FHR, FHR installed and commenced operating a flare gas recovery system on its olefins plant in Port Arthur. This marked the first time that an FGRS was installed and operated at an olefins plant pursuant to an agreement with the United States.

28. In advance of the installation, I reviewed the proposed capacity of FHR's three-compressor FGRS and was satisfied that it was properly sized. The size (*i.e.*, capacity) of a flare gas recovery system is critical to its full utilization as an effective control device for waste gas. On the one hand, it must be sized to capture at least all base load waste gas flow to a flare or group of flares. On the other hand, it cannot be sized to capture all waste gas flow because the volume of gas that can be released as a result of true malfunctions and/or flaring resulting from force majeure events would require a cost-prohibitive number of compressors. Between those two extremes are predictable events (like planned startups and shutdowns) and reasonably preventable malfunctions. EPA evaluates the size of FGRSs on a case specific basis to determine adequacy.

29. Under the proposed Consent Decree, FHR's FGRS is required to be available for operation a high percentage of time. Specifically, FHR is required to have two compressors available for operation 95% of the time and the third compressor available for operation at all times. This is a critical requirement because EPA has found that some companies have not been appropriately maintaining their FGRSs to enable operation on a relatively continuous basis.

30. The Consent Decree, *inter alia*, requires FHR to undertake a root cause analysis and implement corrective action when the Facility flares a certain volume of waste gas. These requirements are designed to enable FHR to evaluate the causes of large flaring episodes and take steps to minimize the possibility of a recurrence of that cause.

31. Under the Consent Decree, FHR will implement a fence line monitoring program to respond to and take corrective action regarding benzene and 1,3 butadiene in the ambient air. Both of these compounds are HAPs. Even before the Consent Decree was made

public, FHR advised us that it had been implementing a fence line monitoring program and that the results of this program showed significant progress. I have reviewed data compiled from FHR's two ambient air monitoring stations. Data from FHR's Miller Farm Road monitoring station peaked in September 2010 at approximately 6 parts per billion ("ppb") on a 12-month rolling average basis. Since then, benzene concentrations have steadily declined. For each month in calendar year 2013, benzene concentrations were below 1.5 ppb on a 12-month rolling average basis at the Miller Farm Road station. Benzene concentrations at FHR's other monitoring station (located on Levee Road) have averaged less than 1 ppb on a 12-month rolling average basis since 2012. Both monitoring stations have generally shown 1,3 butadiene concentrations at below 1 ppb since January 2009.

32. The requirements in the Consent Decree related to flaring controls and fence line monitoring go well beyond current regulatory requirements.

33. When fully implemented, the compliance measures related to the flaring controls in the Consent Decree are projected to reduce emissions of VOCs by approximately 1,605 tons per year ("tpy"); carbon dioxide equivalents ("CO_{2e}") by approximately 69,550 tpy; HAPs by approximately 255 tpy; and nitrogen oxides ("NOx") by approximately 20 tpy. The flaring controls also will reduce carbon monoxide ("CO") emissions. Many of these reductions already have been realized because FHR started implementing flaring control measures even before the Consent Decree was finalized. The reductions are permanent.

34. The Consent Decree also requires FHR to implement two "mitigation" projects. (I describe the meaning of a "mitigation" project below.) Based on information prepared by a consulting firm hired by the City of Port Arthur, the Diesel Retrofit/Replacement

Mitigation project ("Diesel Project") in the Consent Decree is projected to reduce NOx and fine particulate matter ("$PM_{2.5}$") by a combined total of approximately 85 tons and CO by a total of approximately 39 tons in a 15 year period. I reviewed the consulting firm's presentation regarding the projected emission reductions and saw no obvious errors. I believe the estimates are not unreasonable.

35. The quantity of emissions reductions resulting from the second project—energy efficiency project are not easily calculated—but reductions will occur.

36. Emissions of VOCs can lead to smog and haze. VOCs contribute to the formation of ozone which can reduce lung function, causes respiratory symptoms, and increase lung inflammation. Ozone also damages forests and crops, fabric, exterior paints, oil coatings, and automotive finishes. Nitrogen oxides play a major role, with VOCs, in the atmospheric reactions that produce ozone. Nitrogen oxides can also cause acid rain, particulate matter, water quality deterioration, and visual impairment. Fine particulate matter emissions contain microscopic solids or liquid droplets that are so small they can get deep into the lungs. These emissions are linked to a variety of problems, including but not limited to irritation of the airways, coughing, breathing difficulties, decreased lung function, and aggravated asthma. Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues. HAPs are a class of substances which present a threat of adverse human health effects (*e.g.*, carcinogenic, mutagenic, teratogenic, neurotoxic, reproductive dysfunctionality, or acute or chronic toxicity) or adverse environmental effects. CO_2 contributes to global climate change.

37. The compliance measures related to flaring will result in more accurate emissions reporting. In the past, in calculating and reporting emissions from refineries and

petrochemical and chemical plants, industry has assumed that flares achieve 98% combustion efficiency. With the implementation of the flaring injunctive relief in this Consent Decree, that assumption will be replaced by measured data. FHR will report actual emissions.

38. A Supplemental Environmental Project ("SEP") is an environmentally beneficial project which a defendant agrees to undertake in settlement of an enforcement action, but which the defendant is not otherwise legally required to perform. When defendants agree to perform SEPs, they generally do so in exchange for a reduction in the civil penalty that the United States otherwise would secure. SEPs are subject to legal constraints as well as EPA policy guidelines.

39. A mitigation project, by contrast, is a form of injunctive relief that the United States may seek in appropriate enforcement actions. A mitigation project is intended to remedy, reduce or offset the harm caused by past or ongoing violations. In Clean Air Act cases, mitigation projects generally are intended to mitigate the harm caused by the excess emission of air pollutants.

40. Depending upon the facts of a case, the same project may qualify as both a SEP and a mitigation project; it may qualify as one *or* the other; or it may not qualify as either. In this case, the United States and FHR negotiated the two projects in this settlement as mitigation for past excess emissions. The projects are not SEPs.

Pursuant to 28 C.F.R. § 1746, I declare under penalty of perjury that these statements are true and correct to the best of my knowledge and belief.

Patrick Foley

Patrick Foley

9/15/2014

Date